

# General Specifications

## Model AV550G Zirconia Oxygen Analyzer Averaging Converter



GS 11M12D01-01E

### Overview

Zirconia oxygen analyzers are used in combustion facilities to measure the flue gas oxygen concentration. Boiler operators use the oxygen measurement to optimize fuel usage, minimize atmospheric emissions and reduce energy consumption.

A multiple point oxygen measurement system is required for situations when gas stratification in the flue duct affects combustion control. The AV550G Averaging Converter can accept inputs from up to eight zirconia oxygen detectors. It sends output signals for the individual as well as averages of multiple oxygen concentrations. A robust multipoint converter reduces installation and maintenance costs.

A large 5.7-inch color LCD shows various measurement, setup, calibration, and trend screens. Its intuitive touch screen, is easy to read and makes set up and maintenance simple. Other standard features include new self-diagnostics and a hot swap function that allows a desired probe to be disconnected/reconnected for inspection or maintenance just by turning off the power of the relevant channel.

The AV550G Averaging Converter is ideal for combustion control in large utility boilers or various industrial furnaces.



- Failed, in calibration, or alarming, detectors are automatically excluded from average calculations.
- Allows contact input, calibration activation, range change and detector performance validation.
- Remote maintenance using digital communications (HART or FOUNDATION Fieldbus) reduces maintenance costs. \*1

\*1: HART is a registered trademark of HART Communication Foundation.  
FOUNDATION is a registered trademark of Fieldbus foundation.

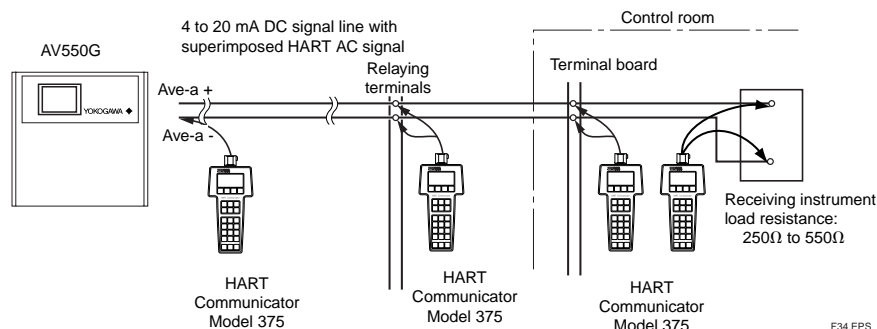
### Features

- Full color touch screen.
- Special trend graph functions with customer graph configuration.
- Multiple display modes shows average data, single detector or all detector gas concentrations.
- Handles input of up to 8 oxygen detectors.
- "Hot swap" of channel cards so the analyzer remains on line while maintenance is performed.
- Eight 4-20mA outputs for individual detectors.
- Three 4-20mA outputs for average oxygen concentration outputs.

### Applications

**Utility Boiler** – With large boilers used in the utility industry, the oxygen concentration varies in different zones across the flue. In order to obtain the most reliable oxygen data, the most common method used is the arithmetical averaging of several measuring points using an external averaging unit. The model AV550G Averaging Converter not only averages the signals but fully controls all of the individual detectors thereby eliminating the need for costly, redundant hardware or DCS programming.

**Process Heater** – Process industries, such as refining, use large numbers of individual oxygen analyzers to maximize the combustion efficiency of process heaters. The model AV550G Averaging Converter receives and controls inputs from oxygen detectors mounted on the same or multiple flues and transmits either individual or averaged output signals.

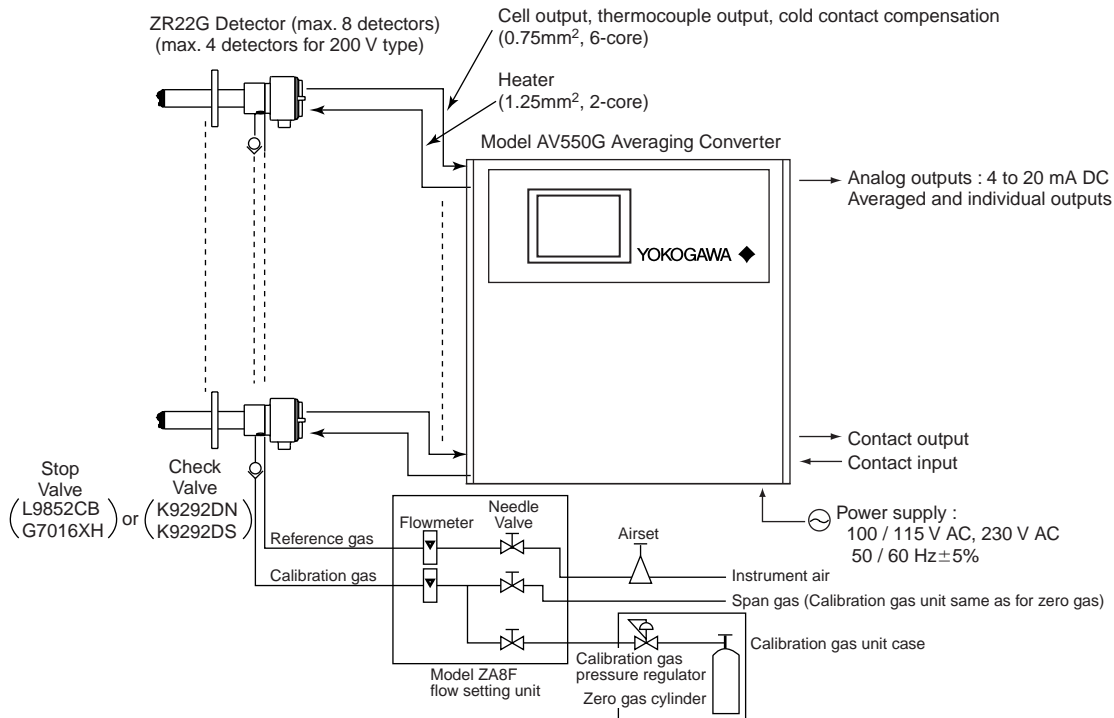


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## Basic System Configuration

- Instrument air is used as the reference gas. (max. 8 detectors)

A standard gas cylinder can be used for the calibration gas for more accurate calibration.



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## ■ STANDARD SPECIFICATIONS (Averaging Converter)

### 1. General Specifications

Compatibility of Detectors : ZR22G, ZO21D, ZO21DW

Number of Detectors : 1 to 8 (100 V type)

Expandable up to 8

Detectors : 1 to 4 (200 V type)

Expandable up to 4

(Note) Specify 4 Channel Base when 200 V type is selected.

Averaging interval: 0.2 seconds

Display: 5.7 inches color LCD display of size 320 by 240 dot with touch screen

Output Signal: 4 to 20 mA DC (maximum load resistance 550Ω)

Average-value Output; 3 points

(Note) Number of averaging output is 2 when suffix code "-F" (FOUNDATION Fieldbus communication) is selected.

Independent Output; Output to each channel  
Common isolation / Individual isolation selectable

Used exclusively for communication when suffix code "-F" (FOUNDATION Fieldbus communication) is selected.

Digital Communication (HART): 250 to 550Ω, depending on number of field devices connected to the loop (multi-drop mode).

(Note) HART is a registered trademark of the HART Communication Foundation.

Contact Output: Contact capacity 30V DC 3A, 250V AC 3A (resistive load)

Normally open / normally close selectable

Common Contact Output; 5 points, Four of the output points can be selected to either normally energized or normally deenergized status. Contact output 5 is normally energized.

Contact Output for Individual Channel Fail; Output to each channel  
Normally energized.

Solenoid Valve Contact Output: Contact capacity 30V DC 1A, 250V AC 1A, voltage free contacts / 24 voltage (option) selectable  
DC 24V power supply Maximum DC 30mA

Contact Input: 2 points, voltage free contacts

Ambient Temperature: -5 to +50°C

Storage Temperature: -20 to +70°C

Humidity Range: 10 to 85%RH (non-condensing)

Installation Altitude: 2000 m or less

Category based on IEC 1010: II (Note)

Pollution degree based on IEC 1010:2 (Note)

Note: Installation category, called over-voltage category, specifies impulse withstand voltage. Category II is for electrical equipment.

Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which may reduce dielectric strength. Degree 2 is the normal indoor environment.

Power Supply Voltage: Ratings; 100 / 115 V AC, 230 V AC

Acceptable range; 85 to 126.5 V AC, 199.5 to 253 V AC

Power Supply Frequency: Rating; 50/60 Hz

Acceptable range; 50 Hz  $\pm 5\%$ , 60 Hz  $\pm 5\%$

**Power Consumption:**  
 Max. 40 W + (120 W)  $\times$  (Number of detectors)  
 for steady operation (100 V type)  
 Max. 40 W + (220 W)  $\times$  (Number of detectors)  
 for warm-up (100 V type)  
 Max. 40 W + (140 W)  $\times$  (Number of detectors)  
 for steady operation (200 V type)  
 Max. 40 W + (220 W)  $\times$  (Number of detectors)  
 for warm-up (200 V type)

**Safety and EMC conforming standards**  
**Safety:** EN61010-1  
 CSA C22.2 No.61010-1  
 UL61010-1  
**EMC:** EN 61326 Class A  
 EN 55011 Class A Group 1  
 EN 61000-3-2  
 EN 61000-3-3  
 AS/NZS CISPR 11

**Maximum Distance between Probe and Converter:**  
 Conductor two-way resistance must be 10 $\Omega$   
 or less (when a 1.25mm<sup>2</sup> cable or equivalent  
 is used, 300 m or less)

**Construction:** Indoor installation  
**Wiring Connection:** Number of wire holes 30 pieces  
 Wire hole size:  $\varnothing 17$  mm for grommet  
 $\varnothing 6$  to  $\varnothing 12$  mm for cable gland  
 (option).

**Installation:** Wall mounting  
**Case:** Aluminum alloy (100 V type), Steel plate and  
 Aluminum alloy (200 V type)  
**Paint Color:** Silver Gray (Munsell 3.2PB7.4/1.2)  
**Finish:** Polyurethane corrosion-resistance coating  
**Weight:** Approx. 13 kg (100 V type), Approx. 25 kg  
 (200 V type)

**Functions:**  
**Display Functions:**  
 Value Display; Displays values of the measured  
 oxygen concentration, etc  
 Graph Display; Displays trends of measured  
 oxygen concentration  
 Data Display; Displays various useful data for  
 maintenance, such as cell temperature,  
 reference junction temperature, maximum/  
 minimum oxygen concentration, or the like.  
 Status Message; Indicates an alarm or error  
 occurrence with flashing of the correspond-  
 ing icon. Indicates status such as warming-  
 up, calibrating, or the like by icon.  
 Alarm, Error Display; Displays alarms such as  
 "Abnormal cell e.m.f." when any such status  
 occurs.

**Calibration functions:**  
 Auto-Calibration; It calibrates automatically at  
 specified intervals.  
 Semi-auto Calibration; Input calibration direction  
 on the touch screen or contact, then it  
 calibrates automatically afterwards.  
 Manual Calibration; Calibration with opening/  
 closing the valve of calibration gas in  
 operation interactively with an LCD touch  
 screen.  
 Validation Function; Permits control room activation

of zero, span or midpoint gas concentrations  
 without running an actual calibration.

**Blowback Function:**

Output through the contact in the set period  
 and time. Auto/semi-auto selectable.

**Maintenance Functions:**

Can operate updated data settings in daily  
 operation and checking. Display data  
 settings, calibration data settings, blowback  
 data settings, current output loop check,  
 input/output contact check.

**Setup Functions:**

Initial settings suit for the plant conditions  
 when installing the converter. Equipment  
 settings, current output data settings, alarm  
 data settings, contact data settings, other  
 settings.

**Self-diagnosis:**

This function diagnoses conditions of the  
 converter or the probe and indicates when  
 any abnormal condition occurs.

**Password Functions:**

Enter your password to operate the analyzer  
 excepting data display. Individual passwords  
 can be set for maintenance and setup

**Display and Setting Content:****Measuring Related Items:**

Oxygen concentration (vol% O<sub>2</sub>)

**Display Items:**

Cell e.m.f (mV), thermocouple e.m.f (mV),  
 cold junction resistance ( $\Omega$ ), cell temperature  
 ( $^{\circ}$ C), cold junction temperature ( $^{\circ}$ C), span  
 correction factor (%), zero correction factor  
 (%), cell response time(second), cell  
 condition(in four grades), cell internal  
 resistance ( $\Omega$ ), next calibration estimate  
 (year/month/day), heater on-time rate (%),  
 time (year/month/day, hour/minute),  
 software revision, maximum/minimum/  
 average oxygen concentration(vol%O<sub>2</sub>),  
 calibration record (ten times), internal  
 temperature rise alarm record.

**Calibration Setting Items:**

Span gas concentration (vol%O<sub>2</sub>), zero-gas  
 concentration (vol%O<sub>2</sub>), calibration mode  
 (auto, semi-auto, manual), calibration type  
 and method (zero-span calibration, zero  
 calibration only, span calibration only),  
 stabilization time (minute/second), calibra-  
 tion time (minute/second), calibration period  
 (day/hour), starting time (year/month/day,  
 hour/minute)

**Equipment Related Items:**

Measuring gas selection; wet/dry  
 Detector selection; ZR22/ZO21

**Output Related Items:**

Analog output/output mode selection, output  
 conditions when warming- up / maintenance/  
 calibrating (during blowback) / abnormal, 4  
 mA / 20 mA point oxygen concentration  
 (vol%O<sub>2</sub>), time constant, preset values when  
 warming-up / maintenance / calibrating

during blowback abnormal, output preset values on abnormal.

**Alarm Related Items:**  
 Oxygen concentration high-alarm/high-high alarm limit values (vol% O<sub>2</sub>), oxygen concentration low-alarm/low-low alarm limit values (vol% O<sub>2</sub>), oxygen concentration alarm hysteresis (vol% O<sub>2</sub>), oxygen concentration alarm detection, alarm delay (seconds)

**Converter** Output: mA analog output (4 to 20mA DC (maximum load resistance of 550V)).  
 Average-value output; 3 points (average value a, average value b, average  $c = \frac{a+b}{2}$ )  
 Independent Output; Output to each channel  
 Range; any setting between 0 to 5 through 0 to 100 vol% O<sub>2</sub> in 1 vol% O<sub>2</sub>, or partial range is available (Maximum range value/minimum range value 1.3 or more)  
 For the log output, the minimum range value is fixed at 0.1 vol% O<sub>2</sub>.  
 4 to 20 mA DC linear or log can be selected.  
 Input/output isolation.  
 Output damping: 0 to 255 seconds.  
 Hold/non-hold selection, preset value setting possible with hold

**Contact** Output: Five points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load)  
 Four of the output points can be selected to either normally energized or normally deenergized status.  
 Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol%O<sub>2</sub>) can be added to high/low alarms.  
 The following functions are programmable for contact outputs.  
 (1) Abnormal, (2) High-high alarm, (3) High alarm, (4) Low-low alarm, (5) Low-alarm, (6) Maintenance, (7) Calibration, (8) Range switching answer-back, (9) Warm-up, (10) Calibration-gas pressure decrease (answerback of contact input), (11) Blowback start, (12) Process alarm (answerback of contact input), (13) Calibration coefficient alarm, (14) Internal temperature rise alarm.  
 Contact output 5 is set to normally operated, fixed error status.

**Contact** Output for Individual Channel Fail: Output to each channel  
 Normally energized.  
 Each channel cards provides a failure contact output.  
 (1)Abnormal cell, (2)abnormal cell temperature(high/low), (3)abnormal channel card, (4)abnormal control card, (5)abnormal card communication

**Contact** Input: Two points, contact input  
 The following functions are programmable for contact inputs:  
 (1) Calibration-gas pressure decrease alarm, (2) Range switching, (3) External calibration

start, (4) Process alarm (if this signal is received, the heater power turns off), (5) Validation start, (6) Blow-back start

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (high/low), abnormal channel card, abnormal control card, abnormal card communication

**Calibration:** Method; zero/span calibration  
 Calibration mode; automatic, semi-automatic and manual (All are operated interactively with an LCD touchscreen). Either zero or span can be skipped.  
 Zero calibration-gas concentration setting range; 0.3 to 100 vol% O<sub>2</sub> (0.01 vol%O<sub>2</sub> in smallest units). Span calibration-gas concentration setting range: 4.5 to 100 vol% O<sub>2</sub> (0.01 vol% O<sub>2</sub> in smallest units). Use nitrogen-balanced mixed gas containing 0 to 10 % scale of oxygen, and 80 to 100 % scale of oxygen for standard zero gas and standard span-gas respectively.  
 Calibration period; date/time setting; maximum 255 days/23hours.

■ **FOUNDATION Fieldbus communication function**  
 The bi-directional digital communication as standard for FOUNDATION Fieldbus that is established by Fieldbus foundation.  
 Interface : FOUNDATION Fieldbus H1 (communication speed : 31.25 kb/s)  
 Physical layer type :  
 113 (standard-power signaling, bus powered, non I.S.)  
 Communication line condition:  
 power supply----9 to 32 VDC, current supply----15 mA (Max)  
 Signal insulation :  
 communication terminal to grand terminal, dielectric strength 500 Vrms (50/60 Hz, 1 min).  
 Device : Link master  
 Function block :  
 AI block :  
 3 blocks (1 block for each channels)  
 Transfer the data of averaging oxygen concentration to other instruments.  
 DI block :  
 2 blocks  
 Transfer the status of error and alarm to other instruments.  
 MAI block  
 1 block (8 channels)  
 Transfer the data of oxygen concentration to other instruments.  
 MAO block  
 1 block (8 channels)  
 Import the data of other instruments.

■ **STANDARD ACCESORRIES (Averaging Converter)**

Name	Part No	Quantity	Remarks
Fuse	A1112EF	2	2.5A
Hexagonal Allen Wrench	L9827AS	1	For lock screw.

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**MODEL AND SUFFIX CODE**

1. Detector

Refer to GS 11M12A01-01E for a detailed explanation of the detector specifications and available accessories.

2. Averaging Converter

Model	Suffix Code	Option Code	Specification
AV550G			Averaging Converter
Base (*1)	-A -B		4 Channel Base 8 Channel Base
Number of Channel Card (*2)	-A1 -A2 -A3 -A4 -A5 -A6 -A7 -A8 -B1 -B2 -B3 -B4 -B5 -B6 -B7 -B8		1 Oxygen Channel Card, Common Isolation 2 Oxygen Channel Cards, Common Isolation 3 Oxygen Channel Cards, Common Isolation 4 Oxygen Channel Cards, Common Isolation 5 Oxygen Channel Cards, Common Isolation 6 Oxygen Channel Cards, Common Isolation 7 Oxygen Channel Cards, Common Isolation 8 Oxygen Channel Cards, Common Isolation 1 Oxygen Channel Card, Individual Isolation 2 Oxygen Channel Cards, Individual Isolation 3 Oxygen Channel Cards, Individual Isolation 4 Oxygen Channel Cards, Individual Isolation 5 Oxygen Channel Cards, Individual Isolation 6 Oxygen Channel Cards, Individual Isolation 7 Oxygen Channel Cards, Individual Isolation 8 Oxygen Channel Cards, Individual Isolation
Display	-J -E -F -G		Japanese English French German
Power supply	-1 -2		100 / 115 V AC 230 V AC (*3)
Communication	-E -F		HART communication FOUNDATION Fieldbus communication (*4)
Options		/SCT /24 /G □□	Stainless steel tag plate 24 Voltage output for Solenoid valve Cable gland (Numbers in □□) (*5)

T02.EPS

(\*1) Select code "-B" (8 Channel Base) when future expansion exceeding 4 channels is expected. By so doing, the expansion can be made economically.

(\*2) Common isolation is recommended, when the same instrument receives the analog outputs from each channel card. Individual isolation is recommended to prevent the trouble by mutual interference, when different instrument receives the analog outputs from each channel card.

(\*3) When suffix code "-2" (230 V AC) is selected, select code "-A" (4 Channel Base).

(\*4) When suffix code "-F" (FOUNDATION Fieldbus communication) is selected, used exclusively for communication.

(\*5) Input 01 to 30 in □ □.

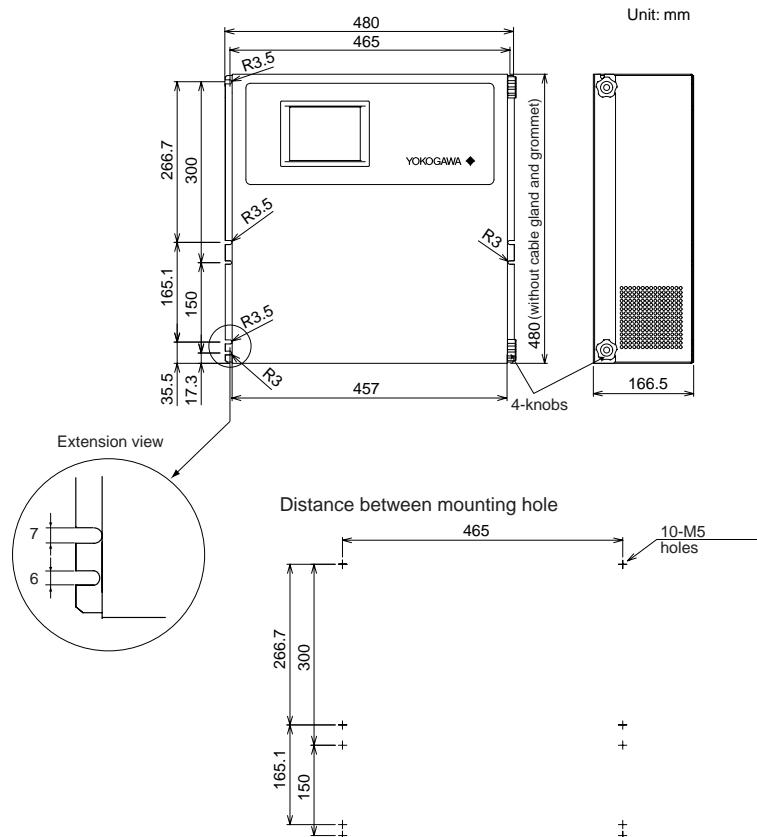
3. Channel Card

Model	Suffix Code	Option Code	Specification
AV55CM			Channel Card
Number of Channel Card (*1)	-A1		1 Oxygen Channel Card, Common Isolation
	-A2		2 Oxygen Channel Cards, Common Isolation
	-A3		3 Oxygen Channel Cards, Common Isolation
	-A4		4 Oxygen Channel Cards, Common Isolation
	-A5		5 Oxygen Channel Cards, Common Isolation
	-A6		6 Oxygen Channel Cards, Common Isolation
	-A7		7 Oxygen Channel Cards, Common Isolation
	-A8		8 Oxygen Channel Cards, Common Isolation
	-B1		1 Oxygen Channel Card, Individual Isolation
	-B2		2 Oxygen Channel Cards, Individual Isolation
	-B3		3 Oxygen Channel Cards, Individual Isolation
	-B4		4 Oxygen Channel Cards, Individual Isolation
	-B5		5 Oxygen Channel Cards, Individual Isolation
	-B6		6 Oxygen Channel Cards, Individual Isolation
	-B7		7 Oxygen Channel Cards, Individual Isolation
	-B8		8 Oxygen Channel Cards, Individual Isolation
—	-A		Always -A
Option		/K1	Expansion power supply unit for dry contact output of solenoid valve output. (*2)
		/K2	Expansion power supply unit for 24 voltage output of solenoid valve output. (*3)

T03.EPS

- (\*1) -A □ are common Isolation types -B □ are Individual Isolation types  
Up to 4 channel cards can be added in the 230 VAC version.
- (\*2) Expansion power supply unit is required, when using the 4 channel base and extending the channel cards to five or more.  
The expansion power supply unit cannot be added in the 230 VAC version.
- (\*3) Expansion power supply unit is required, when using the 4 channel base and extending the channel cards to five more. Available only in U.S.

EXTERNAL DIMENSIONS



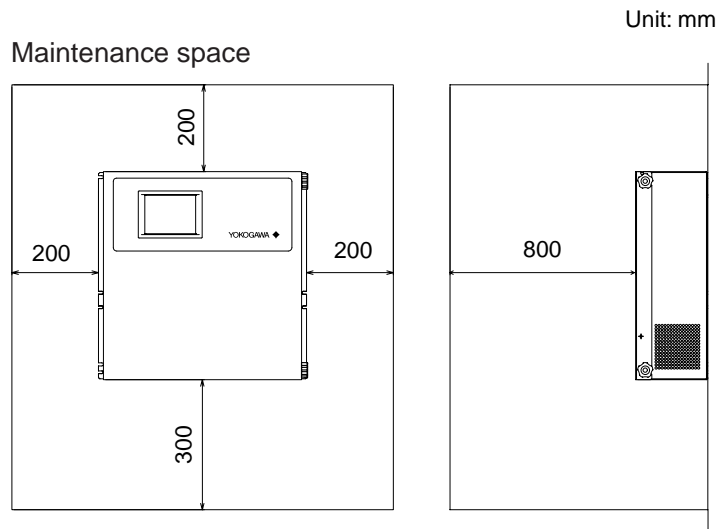
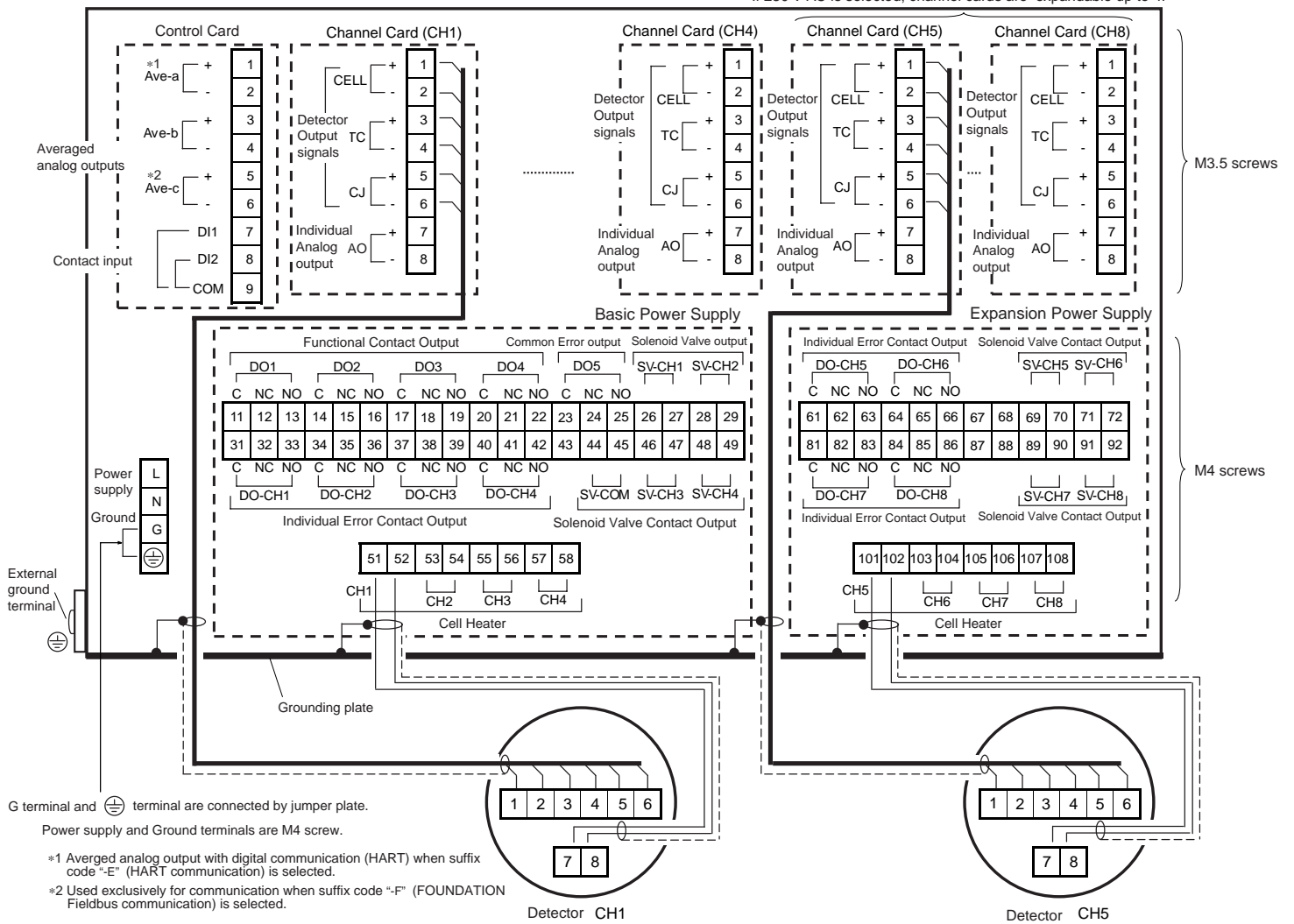


Fig.1 AV550G Averaging Converter

■ WIRING

If 230 V AC is selected, channel cards are expandable up to 4.



Inquiry Sheet for Model AV550G Averaging Converter

Please place checkmarks in the appropriate boxes and fill in the necessary information in the blanks.

1. General information

Customer _____	Object : <input type="checkbox"/> indication <input type="checkbox"/> record <input type="checkbox"/> control <input type="checkbox"/> alarm
Destination of delivery _____	Fuel : <input type="checkbox"/> gas <input type="checkbox"/> oil <input type="checkbox"/> coal <input type="checkbox"/> _____
Plant name _____	Power requirements _____V AC _____Hz
Measurement points _____	

2. Process conditions

2.1 Measurement gas components \_\_\_\_\_

2.2 Oxygen concentration	Nor.	Min.	Max.	<input type="checkbox"/> vol% O <sub>2</sub> ,	<input type="checkbox"/>
2.3 Temperature	Nor.	Min.	Max.	<input type="checkbox"/> °C,	<input type="checkbox"/>
2.4 Pressure	Nor.	Min.	Max.	<input type="checkbox"/> kPa,	<input type="checkbox"/>
2.5 Gas flow	Nor.	Min.	Max.	<input type="checkbox"/> m/sec,	<input type="checkbox"/>
2.6 Dust type, Size	Nor.	Min.	μm	quantity <input type="checkbox"/> g/Nm <sup>3</sup> ,	<input type="checkbox"/>
2.7 Corrosive gas	<input type="checkbox"/> No gas	<input type="checkbox"/> Gas	_____	, quantity <input type="checkbox"/> ppm,	<input type="checkbox"/>
			_____	, quantity <input type="checkbox"/> ppm,	<input type="checkbox"/>
2.8 Combustible gas	<input type="checkbox"/> No gas	<input type="checkbox"/> Gas	_____	, quantity <input type="checkbox"/> ppm,	<input type="checkbox"/>
			_____	, quantity <input type="checkbox"/> ppm,	<input type="checkbox"/>

2.9 Others \_\_\_\_\_

3. Installation site conditions

3.1 Ambient temperature      1. Around Probe temp. from \_\_\_\_\_ to \_\_\_\_\_ °C,      2. Around Converter temp. from \_\_\_\_\_ to \_\_\_\_\_ °C

3.2 Vibration                     No vibration  Vibration \_\_\_\_\_

3.3 1 Probe installation location       Furnace  Stack  Others \_\_\_\_\_

2 Probe position                     Horizontal  Vertical  Others \_\_\_\_\_

Indoor  Outdoor  Covered

3 Probe insertion length (m) (Note)       0.4,  0.7,  1.0,  1.5,  2.0,  2.5,  3.0,  3.6,  4.2,  4.8,  5.4

4 Flange                                 DIN \_\_\_\_\_  ANSI \_\_\_\_\_  Others \_\_\_\_\_

3.4 Instrument air supply                 Cannot be used.  Can be used. \_\_\_\_\_ kPa

3.5 Averaging converter location       Indoor  Outdoor  Covered (under roof)

3.6 Cable length between probe and converter \_\_\_\_\_ meters

3.7 Calibration method                 Manual  Automatic

(Note) 3.6 m or more is available in the U.S.

4. Quotation data

<input type="checkbox"/> Averaging Converter	<input type="checkbox"/> Probe protector
<input type="checkbox"/> Detector	<input type="checkbox"/> Air set
<input type="checkbox"/> Check valve	<input type="checkbox"/> Flow setting unit
<input type="checkbox"/> Rc 1/4 connection	<input type="checkbox"/> ZA8F
<input type="checkbox"/> 1/4 NPT connection	
<input type="checkbox"/> Stop valve	<input type="checkbox"/> Others
<input type="checkbox"/> Rc 1/4 connection	
<input type="checkbox"/> 1/4 NPT connection	

T04.EPS